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Effect of the Pd-Mg modifier, magnetic field, and gas flows on the dynamics of matrix vapors in a transversely heated graphite furnace atomizer

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Abstract

Shadow spectral filming is used to study the spatiotemporal dynamics of the formation and dissipation of vapors of potassium sulfate and aluminum and indium nitrates in a transversely heated graphite furnace atomizer. The integrated platform, the Pd-Mg modifier, the internal flow of the sheath gas, the magnetic field of the nonselective background corrector, and the diffusion of oxygen from the ambient air are responsible for specific nonuniformities in the spatial structure of the vapor cloud. The nonuniformities result to a large extent from the transverse nonisothermal conditions of the graphite furnace. The explosive splashes of aluminum vapors interfering with the analysis are generated at the cold side walls of the graphite furnace, where the vapors are condensed in the process, rather than on the particles of the dry residue of the sample. The beating of the magnetic-field induction inside the graphite furnace atomizer caused by the overlapping of the fields of the heating current (50 Hz) and the background corrector (54 Hz) results in low-frequency (4-5 Hz) oscillations of the spatial position of the vapor cloud. The matrix modifier can stimulate these oscillations.

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